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Long-Term Correlated Change Between Personality Traits and Perceived Social Support in Middle Adulthood

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Abstract

This study investigated long-term correlated change between personality traits and perceived social support in middle adulthood. Two measurement occasions with an eight-year time interval from the Interdisciplinary Study on Adult Development (ILSE) were used. The sample consisted of 346 middle-aged adults (46 to 50 years at T1). Four different types of perceived social support were assessed. Personality traits were assessed with the NEO-FFI. Longitudinal measurement invariance was established for both measures. The mean rank-order stabilities were .79 and .62 for personality traits and for perceived social support, respectively. The results demonstrated a mean-level increase for neuroticism and a decrease for extraversion and significant change variances for all constructs. The results of latent change models showed significant initial level correlations and correlated changes between personality traits and social support, implying that changes in these constructs show commonality. The results can expand our current thinking about correlated change in personality.

Keywords: personality traits; social support; middle adulthood; long-term correlated change; latent change models

Introduction

Social support is related to multiple physical and psychological health benefits, such as lower levels of anxiety, depression, and mortality (Holt-Lunstad, Smith, & Layton, 2010; Taylor, 2011; Uchino, 2009). Despite the benefits of social support, individuals differ in how they perceive social contexts as supportive and in how they tend to feel socially integrated. Several factors may contribute to these individual differences. The Big Five personality traits of agreeableness, extraversion, and neuroticism seem to be most strongly related to perceived social support (Pierce, Lakey, Sarason, Sarason, & Joseph, 1997; Swickert, 2009). This is not surprising, as these traits play an important role in social contexts and influence the perceptions of social interactions. By contrast, it is also possible that social contexts influence personality traits per social support processes. For example, a supportive social network may provide a positive developmental context that encourages personality development. However, given the cross-sectional nature of most previous studies, it is not possible to draw clear conclusions about the longitudinal patterns of personality-social support associations. Longitudinal studies are crucial to understand whether and to what degree changes in the Big Five traits are related to or independent of changes in perceived social support over time. For example, positive correlated change between a personality trait and an indicator of social support would indicate that the same individuals who show increases in the trait also increase in social support, whereas individuals showing decreases in the trait also decrease in social support.

The present longitudinal study thus sought to extend the literature in two ways. First, we tested latent correlations between the Big Five traits and perceived social support in middle adulthood using a measure that captures four different types of perceived social support. Second, we examined long-term correlated change between personality traits and perceived social support over an eight-year time interval in middle adulthood.

Perceived Social Support in Middle Adulthood

Perceived social support is the result of individuals' perceptions and appraisals of supportive behavior, such as giving or receiving aid, affect, or affirmation. It refers to perceptions of support available from others, as well as support that is actually received from or given to others (Cohen, Underwood & Gottlieb, 2000). Although perceived and received support are conceptually related they reflect distinct constructs with different antecedent processes (for a review, see Uchino, 2009).

Several types of perceived social support can be distinguished (Fydrich, Sommer, & Brähler, 2007). For example, emotional support refers to the support that one receives or provides by communicating that one is loved or cared for by close and significant others. It also might include the enhancement of self-esteem and feelings of belongingness. Practical support refers to instrumental or tangible support in daily life. Informative support includes giving or receiving guidance and advice from others. It also may include an approval or agreement by others that the values and beliefs, goals, and aspirations are shared. According to Hittner and Swickert (2001) individuals rely more strongly on the perception of the availability of support over structural characteristics (e.g., network size and type, level of contact with the network members) that define their social network when perceiving support from others. Regardless of the characteristics of the support network and the subjective perception of the availability of support or actual received support, there are individual differences in what individuals need, what they think they need, how they react to specific supports, and how they feel about specific supporting persons.

All types of support are important at some points in the lifespan but there are specific needs in middle adulthood (Allemand, in press; Willis & Martin, 2005). Middle-aged adults may need help providing practical support to their parents, spouse, or children. When struggling with the tasks of midlife, it can be very helpful to know that others support you emotionally and also share your views, and understand and approve your goals and aspirations. Middle adulthood is a challenging period with diverse biosocial changes and

numerous, complex social relations (Allemand, in press; Lachman, 2001, 2004). For example, middle-aged adults generally have to deal with multiple social roles with widest responsibilities and challenges. This includes work careers, but also family roles in terms of partner relationships and relationships with children and parents (Willis & Martin, 2005). The number and the nature of the multiple social roles change systematically during middle adulthood (Helson & Soto, 2005).

Moreover, some individuals experience difficult life events, such as changing jobs or giving up an important career dream during midlife (Allemand, in press; Allemand, Gomez, & Jackson, 2010). There appears to be a decrease in the perception of reciprocity in social relationships at this time, with most middle-aged adults feeling that they are providing more support than they are receiving (Antonucci, Akiyama, & Merline, 2001). This can lead to social conflicts and problems. Indeed, social interactions with others are not always supportive (Harber, Schneider, Everard, & Fisher, 2005; Steiner, Allemand, & McCullough, 2011). Individuals may feel criticized, smothered, offended, controlled, or overextended by their social network. Such experiences cause dissatisfaction with the supportive contexts and, in the worst case, may lead to disintegration from the social network.

Personality Traits and Perceived Social Support

There are a number of theoretical reasons for associations between personality traits and social support (cf. Pierce et al., 1997; Swickert, 2009). First, personality factors may influence how supportive behavior is perceived and responded (Pierce et al., 1997). For example, neurotic individuals are less likely to perceive other persons in their social network as being supportive, as compared to emotionally stable individuals (Russel, Booth, Reed, & Laughlin, 1997). Second, personality factors may evoke distinct reactions from others. This suggests that individuals differ in the manner in which they evoke supportive or unsupportive behaviors from others (Pierce et al., 1997). To illustrate, a person who is prone to experience anger and hostility might be more difficult to interact with, and thus would receive less

support from members of the social network (Dehle & Landers, 2005). Third, individuals tend to actively select or create social environments consistent with their personality. Hence, one would expect that individuals actively construct their social support network consistent with their personality (Pierce et al., 1997). For example, extraverted individuals are more outgoing and enjoy being around others and typically have a wider circle of friends than introverts. Indeed, they tend to report a larger number of people in their network as compared to less extraverted individuals (Swickert, Rosentreter, Hittner, & Mushrush, 2002). A larger network thus would have implications for social support. When extraverts need support, they can turn to a larger number of individuals. It is important to note that the associations between personality traits and social support should not be seen as unidirectional, but rather as reciprocal (Asendorpf & Wilpers, 1998).

Following these arguments, one would expect significant associations between personality traits and perceived social support. Indeed, empirical research repeatedly found that agreeableness, extraversion, and neuroticism seem to be most strongly related to various forms of social support (e.g., Asendorpf & van Aken, 2003; Branje, van Lieshout, & van Aken, 2005; Swickert, Hittner, & Foster, 2010; von Dras & Siegler, 1997). Briefly, agreeableness refers to social traits that reflect individual differences in the propensity to be altruistic, trusting, modest, and warm (John & Srivastava, 1999). Agreeable individuals are more motivated to maintain positive relationships with others and they tend to engage more in social behaviors that facilitate intimacy (Jensen-Campbell & Graziano, 2001). Such characteristics are helpful in supportive social contexts. Indeed, studies have shown that agreeableness is related to various forms of social support but is most strongly related to perceived availability of social support (cf. Swickert, 2009).

Extraversion also has a strong sociability component and refers to individual differences in the propensity to be sociable, active, assertive, and to experience positive affect (John & Srivastava, 1999). Extraverted individuals enjoy interacting with others. Therefore they may

have more opportunities to seek out and receive social support from others (Amirkhan, Risinger, & Swickert, 1995). Research has shown that extraversion shows a more robust and consistent relationship with perceived availability of social support than with received social support (cf. Swickert, 2009).

Neuroticism, or conversely, emotional stability contrasts even-temperedness with the experience of anxiety, worry, anger, and depression (John & Srivastava, 1999). Neurotic individuals tend to show greater avoidance coping (Lee-Baggley, Preece, & DeLongis, 2005). They also tend to report less positive and more negative social interactions (Russel et al., 1997). Consequently, such characteristics may lead to social conflicts and problems and prevent social supportive behaviors from others.

Although previous research reported significant associations between various forms of perceived social support and the three Big Five traits, these results were almost exclusively cross-sectional in nature, and as such it is not clear whether these associations also hold longitudinally. One notable exception should be noted. A recent longitudinal study with 143 older adults found evidence for initial perceived social support predicting change in conscientiousness over a time interval of seven months (Hill, Payne, Jackson, Stine-Morrow, & Roberts, 2013). Predictive cross-domain level-change associations were evidenced for overall conscientiousness and two subscales (order and self-control). Moreover, Hill et al. (2013) found a significant residual correlation between change scores in order and change scores in perceived social support. This latter result is informative for making predictions about the longitudinal associations between conscientiousness and social support.

Goals of the Present Study

This study examined the associations between the Big Five traits and perceived social support over eight years in middle adulthood using a two-wave longitudinal design. We examined four types of *perceived* or anticipated social support: (a) emotional support, (b) practical support, (c) social integration, and (d) social strain, i.e., perceived distress from the

social network (Fydrich et al., 2007). In addition to emotional and practical support discussed above, we included two more evaluative types of social support. Social integration refers to the perception of being integrated in a social network, whereas social strain refers to the negative side of social interactions. It reflects the fact that social interactions are not always supportive (Fydrich et al., 2007).

We had two specific goals. The first goal was to establish longitudinal measurement invariance (MI) of the measures of personality traits and perceived social support to ensure that the constructs are comparable across the two measurement occasions (Meredith & Horn, 2001). Frequently, in developmental studies, it is implicitly assumed that the measurement process of constructs is similar over time. But changes can only be unambiguously interpreted as a reflection of a developmental process when items of a questionnaire do not change connotation or contribution to the construct over time. Therefore, establishing MI is an essential measurement prerequisite for the study of constructs over time (e.g., Allemand, Zimprich, & Hertzog, 2007; Meredith & Horn, 2001; Widaman, Ferrer, & Conger, 2010).

The second goal of this study was to examine the associations between personality traits and perceived social support in two ways. First, we tested the correlations between personality traits and perceived social support at the initial level. Based on the literature cited above, we expected positive correlations between the traits agreeableness, extraversion, and low neuroticism, and perceived social support. Second, we examined correlated change between personality traits and perceived social support to understand whether and to what degree personality trait changes are related to or independent of social support changes in the long term. The concept of correlated change addresses the question of whether there is commonality in change across variables (cf. Hertzog & Nesselroade, 2003; McArdle & Nesselroade, 1994). If points of reference are assumed to be different between individuals but to remain stable within an individual across time, each individual may serve as his or her own control group. In that case, one can infer that the degree of correlated change represents the

relationship between the variables in a way that is more precise and uncontaminated by initial differences. We expected correlated change between the traits of agreeableness, extraversion, neuroticism, and social support. Due to unreliability of simple change scores between manifest variables, we decided to use latent change models (cf. Hertzog & Nesselroade, 2003; McArdle & Nesselroade, 1994, 2014) to examine correlated change. To facilitate comparison with other personality development studies, we report the stability of the constructs of interest by means of rank-order stability and mean-level change.

Method

Participants

Participants were drawn from the Interdisciplinary Study on Adult Development (ILSE; see Allemand et al., 2007; Allemand, Zimprich, & Martin, 2008). In ILSE, participants come from two age cohorts, one comprised of individuals born before World War II and the other including individuals born shortly after the war (i.e., 1930-1932 versus 1950-1952). The ILSE started in 1994, followed by reassessments in 1998 and in 2006 (for more information about the ILSE, see Allemand et al., 2007, 2008). We selected the younger age cohort, as the present study exclusively focused on middle adulthood. Given that the measure of social support was included at the second and third measurement occasion, whereas data for personality traits exist for all three occasions, we focused on the two occasions only.

As from now we refer to the two measurement occasions as T1 and T2. The first data wave (T1) consisted of 446 middle-aged adults (48% were female). The mean age was 47.8 years (SD = 0.9; range: 46 to 50 years). On a 5-point Likert-type scale ranging from 1 (*poor*) to 5 (*very good*), average subjective health was 3.8 (SD = 0.9). The longitudinal sample consisted of 346 participants (77.6% from T1). To test for attrition effects, we compared continuers (n = 346), who participated at T1 and T2, to dropouts (n = 100), who only participated at T1 or for whom no data on the variables of interest at T 2 did exist. Continuers were slightly more extraverted (d = .23), open to experience (d = .20) and agreeable (d = .28)

than dropouts. The groups did not significantly differ with respect to neuroticism (d = .09) and conscientiousness (d = .04). Moreover, continuers had slightly higher scores in perceived emotional support (d = .29), practical support (d = .28), and social integration (d = .42), and lower scores in social strain (d = .32) than dropouts. Although the two groups differed statistically significantly in most variables except for neuroticism and conscientiousness, these differences reflect small effects (Cohen, 1988) and are indicative of moderate selectivity effects. The findings in this paper are based on the continuer sample (N = 346).

Measures

Big Five traits. The Big Five personality traits were assessed using the German version of the NEO-Five Factor Inventory (NEO-FFI; Borkenau & Ostendorf, 1993). The NEO-FFI consists of 12 items per scale, which were rated on a five-point Likert-type scale ranging from 0 (*strongly disagree*) to 4 (*strongly agree*). The internal consistencies ranged from .66 to .84 at T1 and from .62 to .86 at T2.

Perceived social support. Social support was assessed using the Questionnaire for Social Support (FSozU-54; Fydrich et al., 2007). The FSozU-54 was designed to measure *perceived* social support by quantifying the quality of subjectively perceived and anticipated support resources rather than measuring the received support or the objective number of social networks. It consists of 54 items, which were rated on a five-point Likert-type scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). For this study we used the following scales: emotional support (16 items; e.g., "I have friends/relatives who are good listeners when I need to talk about what's bothering me"), practical support (9 items; e.g., "There are people I could temporally stay with"), social integration (13 items; e.g., A lot of my friends/relatives have an attitude toward life similar to my own"), and social strain (12 items; e.g., "I feel rejected by people who are important for me"), i.e., distress from the social network. Several studies provided support for the FSozU-54 being a reliable and valid instrument (e.g., Fydrich, Geyer, Hessel, Sommer, & Brähler, 1999; Fydrich et al., 2007). In

the present study the internal consistencies ranged from .79 to .88 at T1 and from .80 to .89 at T2.

Analytic Strategy

Longitudinal measurement models. To investigate our research goals, we used longitudinal structural equation modeling (SEM; McArdle & Nesselroade, 2014; Jackson & Allemand, 2014). We first established longitudinal measurement models separately for personality traits and social support aspects. The personality measurement model consisted of five latent factors at T1 and T2, whereas the perceived social support measurement model consisted of four latent factors at both assessments. For each of the five and four latent variables, respectively, we created parcels to form three manifest indicators rather than using single items as manifest indicators. A parcel is an aggregate-level indicator comprised of the average (or sum) of several single items (see Little, Rhemtulla, Gibson, & Schoemann, 2013; Marsh, Lüdtke, Nagengast, Morin, & Von Davier, 2013 for benefits and disadvantages of parceling). To create parcels, we used the item-to-construct balance technique (Little, Cunningham, Shahar, & Widaman, 2002, p. 166). Briefly, the three items with the highest loadings were selected to anchor the three parcels of each personality factor. Subsequently, the three items with the next highest item-to-construct loadings were added to the anchors in an inverted order. This procedure was repeated until all items had been assigned to a parcel. This approach reduces the number of model parameters that need to be estimated. We allowed for correlated residual variances for the matching parcels at T1 and T2 (Marsh & Hau, 1996).

In order to identify and scale the models, instead of using traditional procedures such as setting the loading of one manifest reference variable to unity and the intercept of this reference variable to zero, we utilized an alternative parameterization to identification and scale setting (see Allemand et al., 2007, p. 332): Common factors were scaled by fixing their variances to unity at T1, and all loadings were estimated freely. Furthermore, we set the factor means to zero and estimated intercepts of all manifest indicators instead. These identification

constraints were relaxed in conjunction with more restrictive models of MI (see below).

Longitudinal measurement invariance. To examine whether the measures behave equivalently across the two assessments, we tested for MI of the measures. Longitudinal MI includes fitting confirmatory factor models with increasingly severe restrictions on three measurement parameters over time: factor loadings, intercepts, and residual variances (Meredith & Horn, 2001; Widaman et al., 2010). We tested MI separately for the measures of personality traits and perceived social support and performed the longitudinal MI analyses in a sequence of four steps (Meredith & Horn, 2001; see Allemand et al., 2007, p. 333): (1) we first tested an unconstrained measurement model (M1: Configural invariance) that longitudinally specified the relationship between manifest indicators (e.g., parcels) and the latent constructs (e.g., personality traits). The factor variances were fixed to unity at both assessments and the factor means were fixed to zero at both assessments. (2) A model of weak MI (M2) requires equal factor loadings over time. The factor variances were freely estimated at T2. (3) A model of strong MI (M3) requires equal factor loadings and equal indicator intercepts over time. The factor means were freely estimated at T2. Establishing strong MI allows for meaningfully comparing means, covariances, and variances across measurement occasions. (4) A model of strict MI (M4) requires equal factor loadings, equal indicator intercepts, and equal indicator residual variances over time. This strictest form of invariance implies that all of the differences in means, covariances, and variances of the observed indicators across measurement occasions arise from differences in latent variables or factors.

Latent change models. To examine the correlations between the initial levels and change levels, we modeled interindividual differences in intraindividual change in the constructs using latent change models (McArdle, 2009; McArdle & Nesselroade, 1994, 2014; McArdle & Hamagami, 2001). Latent change models involve a reparameterization of the structural part of the longitudinal factor model (McArdle & Nesselroade, 1994; see also

Allemand et al., 2007, pp. 334-335). In latent change models, the level of a latent construct and the change of this latent construct over time are estimated. More precisely, if the manifest indicators at T1 and T2 load on one latent variable and the unstandardized factor loadings of the indicators are invariant over time, and a second latent variable with equal factor loadings is introduced for the indicators at T2, the variance of this second latent variable captures interindividual differences in latent variable change over time. Thus, the second latent variable may be called a latent change factor. It follows that if the variance of the second latent variable is significantly different from zero, there are interindividual differences in intraindividual change (cf. Mroczek, Almeida, Spiro, & Pafford, 2006).

To examine the correlations between personality traits and perceived social support, we estimated five latent change models separately for each personality trait in combination with the four perceived social support constructs at a time (models M5 to M9). This allowed for the study of correlations at the initial level and between the change factors (correlated change). Modeling change on the latent level rather than on the manifest level accounted for random measurement error.

All models were estimated using maximum likelihood estimation in Mplus 6 (Muthén & Muthén, 1998-2012). To assess goodness of fit of the models, we examined the chi-square (χ^2), comparative fit index (CFI), and root mean square error of approximation (RMSEA) statistics including the 90% confidence intervals. In general, CFI values above .95 and RMSEA values below .06 are typically considered to indicate that a model is adequately parameterized and reflects a good fit, although values above .90 and below .08, respectively, are acceptable (Browne & Cudeck, 1993; Hu & Bentler, 1998). Model comparisons were performed using nested chi-square ($\Delta\chi^2$) tests. Since the RMSEA is virtually independent of sample size, the comparison of RMSEA CIs provides an effective, alternative method of assessing relative model fit of nested models. Moreover, a change in the CFI of less than .01 amounts to a trivial difference in model fit (Cheung & Rensvold, 1999).

Results

Longitudinal Measurement Invariance

Table 1 presents descriptive statistics and zero-order correlations among the study variables. To establish MI of the measure of personality traits, we first started with the least restrictive model (M1: Configural invariance) that constrains manifest indicators (parcels) to load on the same factor (personality trait) over time. As can be seen from Table 2, this model did achieve an acceptable model fit as judged by the CFI and RMSEA[1]. Second, factor loadings were constrained to be equal over time (M2: Weak invariance). This more restrictive model also achieved an acceptable fit and did not significantly differ from M1 (Table 2). Third, in addition to equal factor loadings, indicator intercepts were constrained to be equal over time (M3: Strong invariance). This model achieved an acceptable fit (Table 2). Although in comparison to M2 the nested chi-square difference was statistically significant, the RMSEA was identical and the CFI change of .002 reflects a trivial difference in model fit (cf. Cheung & Rensvold, 1999). From these results, one might conclude that strong invariance holds over time with respect to the measure of personality traits. Finally, in the most restrictive model, all three measurement parameters were constrained to be equal over time, including equal residual variances over time (M4: Strict invariance). This model achieved an acceptable fit (Table 2). In comparison to M3, M4 did not represent a statistically significant reduction in model fit. This suggests that strict MI did hold in this sample for the parcels of personality and thus adequately captured the data.

Tests of MI for the measure of perceived social support also demonstrated strict MI (M1 to M4, Table 2). In summary, the results indicated that the measures of the constructs of interest as represented by manifest parcels behaved equivalently across the two assessments.

Longitudinal Change and Individual Differences in Change

Based on strict MI (M4), we then examined the stability of the constructs in terms of rank-order stability and mean-level change. We found significant rank-order stability in the

latent personality traits and social support constructs over the eight-year time periods (Table 3). Because stability coefficients typically confound true change and reliability, estimating latent stability correlations corrects for error, and as a result these stability estimates are better estimates than raw stability coefficients. The mean rank-order stability index across all latent personality traits and social support variables, respectively, was calculated as follows. First, the stability correlations were converted to the Fisher's *z* metric. Second, the mean of the converted correlations was calculated and then converted back to the correlation unit, resulting in $r = .79$ (personality traits) and $r = .62$ (social support). The difference in magnitude between the correlations was statistically significant, $z = 4.54$, $p < .01$. These findings show that the perceived social support constructs were less stable in terms of rank-order stability than the Big Five personality traits. In general, these results imply the existence of individual differences in change of personality traits, because rank-order stability was less than perfect.

To formally test for mean-level changes, we constrained factor means to be equal across measurement occasions simultaneously for the five traits and the four social support constructs, respectively. In comparison to M4 (Table 2), the model of equal longitudinal personality trait means resulted in a significant loss in fit, $\Delta\chi^2$ (5) = 26.34, $p < .01$. The differences in CFI ($\Delta = .004$) and RMSEA ($\Delta = .001$), however, were small. The model of equal social support means did not lead to a decrease in fit, $\Delta\chi^2$ (4) = 1.84, *ns*, suggesting that perceived social support did not change over time. Table 3 presents the mean-level changes in the latent constructs, scaled as mean differences from T1 as reference (based on M4). The results demonstrated two statistically significant mean-level changes over time in middle adulthood: Neuroticism tended to increase over time, whereas extraversion tended to decrease.

Next, we estimated latent change models separately for the personality traits and social support constructs. The overall fit of the models exactly mirrored the fit of the longitudinal

measurement models (see M4, Table 2). Table 3 presents within-domain level-change correlations, change variances, and standard errors for all constructs. The within-domain level-change associations for traits and social support constructs were all negative (Table 3) and with effect sizes in the small to medium range (Cohen, 1988). These negative correlations imply that participants with higher initial scores, for example in neuroticism, tended to show less pronounced changes in neuroticism over time. More important, the results of these analyses demonstrated significant change variances for personality traits and perceived social support constructs (Table 3). Significant change variances imply that the constructs demonstrated interindividual differences in intraindividual change (cf. Mroczek et al., 2006). In summary, although there were only two significant mean-level changes, middle-aged individuals significantly differed in their change patterns from T1 to T2. Significant change variances are an important precondition to examine whether variations in change scores are interrelated over time.

Initial Level Correlations and Correlated Change

To examine initial level correlations and correlated change, we estimated five latent change models that included one of the Big Five trait and the four social support constructs in the same latent change model at a time[2]. Table 4 presents the model fits of the five models and the latent correlations. For this paper, we report the initial level correlations and correlated change between personality traits and perceived social support because these associations were of primary interest.

As expected, neuroticism significantly correlated with all four aspects of perceived social support at the initial level (M5, Table 4), with correlations representing medium-sized to large effects (Cohen, 1988). Moreover, changes in neuroticism correlated with changes in all social support constructs. This suggests that increases in neuroticism were related to decreases in the three positive aspects of social support and increases in perceived distress from the social network. Extraversion was related to perceived social support in a similar way

at the initial level as well as with respect to correlated change (M6, Table 4). The correlations represent medium-sized effects. Openness to experience was also correlated with social support constructs except for perceived social strain at the initial level (M7, Table 4). Changes in social support variables were significantly correlated with openness. We evidenced significant initial level correlations with all perceived social support constructs for agreeableness (M8, Table 4). In terms of effect sizes, the correlations were medium-sized. Statistically significant correlated change associations were found for all latent constructs of perceived social support, although the association between agreeableness and emotional support was only marginally statistically significant. Finally, conscientiousness demonstrated significant and medium-sized initial level associations with all latent constructs of perceived social support (M9, Table 4). The correlated change effects were relatively similar in magnitude to the initial level correlations.

In general, the magnitudes of the initial level correlations and change correlations were very similar. Therefore, we formally tested whether the level and change covariances between traits and perceived social support differed significantly by constraining them to be equal. Compared to M5, a model with equal level and change covariances between neuroticism and perceived social support led to a marginally significant decrease in model fit, $\Delta\chi^2$ (4) = 9.32, $p < .06$. However, the CFI and RMSEA did not change. Therefore we concluded that the level and change covariances were equal. Constraining the initial level and change covariances for the social support associations with extraversion and openness to experience, respectively, did not lead to a significant decrease in model fit, $\Delta\chi^2$ (4) = 3.81, *ns* and $\Delta\chi^2$ (4) = 4.30, *ns*, respectively. Constraining level and change covariances between agreeableness and perceived social support to be equal resulted in a decrease in fit, $\Delta\chi^2$ (4) = 10.56, $p < 05$. However, the RMSEA did not change and a change of $\Delta = .001$ in the CFI reflects a trivial difference in model fit. Therefore we concluded that the covariances were equal. Finally, the test of equality of level and change covariances for the associations with conscientiousness

supported the equality assumption, $\Delta\chi^2$ (4) = 4.78, *ns*. In summary, the results indicated that the level and change covariances between traits and perceived social support were equal.

Table 4 also presents cross-domain level-change associations between traits and social support constructs and vice versa. Again, with few exceptions, the level-change correlations were negative. These correlations imply that participants with higher initial scores, for example in perceived emotional support, tended to show less pronounced changes in openness to experience over time. From the cross-domain level-change correlations, 25% reached statistical significance. The majority of the significant level-change correlations refer to associations between levels of social support and changes in personality traits, but the effect sizes were generally small. It should be noted that estimating correlations between level and change scores is difficult in a study with a two-wave design (cf. Raudenbush & Bryk, 2002, p. 166).

Discussion

This study examined long-term correlated change between the Big Five personality traits and perceived social support in middle adulthood, as social support processes might be particularly important during this challenging and complex life period (Allemand, in press; Lachman, 2004; Willis & Martin, 2005). This study makes multiple important contributions to our knowledge of associations between personality traits and perceived social support. First, we demonstrated longitudinal measurement invariance of the measures of personality traits and perceived social support. Second, in support of previous research, we found evidence for initial level correlations between the two domains. Third, our results suggest that the two domains are not only interrelated at the initial level but also demonstrate commonality in change over eight years in middle adulthood. Whereas the initial level correlations address time-specific relations between personality traits and perceived social support, correlated change provides information on the degree to which these variables change in concert. We discuss these primary and other findings in greater details below.

As a first goal, we examined longitudinal measurement invariance of the measures of personality traits and perceived social support. This issue has received increasing attention in the literature on personality development (e.g., Allemand et al., 2007, 2008; Jackson & Allemand, 2014). In this study, we demonstrated strict MI for both measures over time. That is, the loadings of the manifest parcels, the indicator intercepts, and the residual variances were equivalent over time, which warranted unbiasedness of the measures across measurement occasions. In other words, the measures behaved equivalently across the two assessments in middle adulthood. Establishing MI is essential for studying constructs over time (Meredith & Horn, 2001; Widaman et al., 2010).

Based on strict MI we then tested for longitudinal change of the constructs and found relative high levels of stability over eight years with respect to latent stability correlations and latent means of the Big Five and social support constructs. These findings were largely consistent with previous meta-analytic work on stability and change of personality traits (Roberts & DelVecchio, 2000; Roberts, Walton, & Viechtbauer, 2006), except for an unexpected mean-level increase in neuroticism across the middle years. However, a longitudinal study using a large national sample of Germans also found a slight increase in neuroticism during middle adulthood (Lucas & Donnellan, 2011). More importantly, we found significant interindividual differences in intraindividual change for the Big Five traits and the social support constructs, implying that some individuals change, whereas others remain stable, and also individuals differ in degree and direction of change (Mroczek et al., 2006; Roberts & Mroczek, 2008). Significant change variances are an important prerequisite for the study of correlated change.

As a second goal, we examined associations between personality traits and perceived social support at the initial level and as correlated change. All constructs were modeled at the latent level and thus were corrected for random error. In line with prior work, agreeableness and extraversion were positively related to “positive” aspects of perceived social support,

whereas neuroticism was negatively associated with perceived social support, except for social strain (e.g., Asendorpf & van Aken, 2003; Branje et al., 2005; Swickert et al., 2010). In terms of effect size, the initial level correlations represented medium-sized to large effects.

Long-Term Correlated Change

Most important, the personality traits-social support associations also held longitudinally over eight years, reflecting the fact that individual change in one personality trait was accompanied by a tendency of proportional individual changes in perceptions of social support. This implies commonalities in change between the two domains. To our knowledge, this study is the first to present evidence for correlated change between the Big Five traits and perceived social support over eight years in middle adulthood (but see Hill et al., 2013 for results with respect to conscientiousness).

On the individual level, becoming more agreeable and extraverted and less neurotic raises the probability of perceiving social relationships and social interactions as highly supportive. Individuals increasing in "social" personality traits also tended to increase in the positive aspects of social support and decrease in social strain. It is possible then that individuals who are more motivated to maintain positive social relationships with others and also enjoy interacting with others are also more likely to experiences benefits on integration to a larger social network with concomitant benefits for social positive interactions as well as adaptive perceptions of the availability of social support (Amirkhan et al., 1999; Jensen-Campbell & Graziano, 2001; Swickert, 2009). Neurotic individuals tend to have lower thresholds for experiencing negative emotional states during social interactions, and they marshal more attention toward negative stimuli than do emotionally stable individuals (Derryberry & Reed, 1994; Donnellan, Larsen-Rife, & Conger, 2005). It is possible then that changes in the sensitivity toward negative experiences and states is associated with increases in rather negative perceptions of the social environment (Pierce et al., 1997). Our results of

commonality between changes in adaptive perceptions of the social support network and changes in personality traits support this view.

The results of correlated change may reflect the fact that becoming more agreeable and extraverted and less neurotic represent characteristics that are helpful in social interactions among support network members, such as the tendency to have less conflict with others (Asendorpf & Wilpers, 1998). In contrast, neurotic individuals tend to respond poorly to social stress and interpersonal difficulties (Steiner, Allemand, & McCullough, 2012). Hence, individual differences in emotional instability and low adjustment may evoke unsupportive behaviors from social network members such as withdrawal, avoidance, or stress reaction (Pierce et al., 1997).

The present results of correlated change may also support the idea that individuals tend to select or create social supportive environments consistent with their personality (Pierce et al., 1997). Extraverted individuals seek out interactions with others and utilize social support to compensate for their lowered arousal, whereas introverts tend to withdraw from over-stimulating social interactions (Swickert et al., 2002; Wilt & Revelle, 2009). For example, Eaton and Funder (2003) found that extraverts behaved more socially than introverts, and that extraverts influence the behavior, affect, and interpersonal judgment of those with whom they interacted, generally by creating a more positive social environment. Consistent with this research, we found that the indicators of the perceived supportive environment demonstrated relatively large commonalities in change with personality traits.

In addition to the three consistently reported correlates of perceived social support (e.g., Pierce et al., 1997; Swickert, 2009), this study evidenced correlated change between conscientiousness and social support. Conscientiousness refers to the propensity to follow socially prescribed norms and rules, to be goal-directed, planful, able to delay gratification, and to control impulses (John & Srivastava, 1999). This personality trait is relevant for the individual and the society. Conscientiousness is related to more effective functioning in

multiple domains such as family, work, and health (Hill, Turianio, Hurd, Mroczek, & Roberts, 2011; Roberts, Kuncel, Shiner, Caspi, & Goldberg, 2007; Roberts, Walton, & Bogg, 2005). Moreover, conscientious individuals are more likely to be committed to and involved with their family, work, and community (Lodi-Smith & Roberts, 2007). It is possible then that becoming more conscientious is related to lower thresholds for perceptions and reactions to supportive networks. Furthermore, studies have shown that conscientious individuals report greater levels of satisfaction with support providers (Asendorpf & Van Aken, 2003; Dehle & Landers, 2005). It is also plausible that individuals who are responsible, dependable, and able to inhibit pre-potent responses might be more rewarding to interact with, and thus would elicit more support from others over time.

Based on these arguments, it seems plausible that conscientiousness changes in concert with social support variables on the individual level. Some support for our results come from the study by Hill et al. (2013). However, the two studies differed in several ways. First, the targeted age group was different (older versus middle-aged adults). It is possible that age moderates the associations between personality traits and indicators of social support partly because of specific needs in different periods in the lifespan. Second, the longitudinal time interval between the assessments differed (7 months versus 8 years). It is possible that the longitudinal associations between traits and social support constructs vary as a function of the time interval. The time that is needed to accurately capture systematic change in the construct of interests as well as the degree to which observed associations between changes reflect actual correlated change is an important developmental issue. Third, the analytical approach was different. Hill et al. (2013) explicitly tested for predictive effects of social support levels on change in conscientiousness, controlling for the stability of conscientiousness. In this study, we focused primarily on the commonality in long-term change.

Finally, the present study also evidenced correlated change between openness to experience and social support. Openness to experience refers to individual differences in the

propensity to be original, complex, creative, and open to new ideas (John & Srivastava, 1999). In contrast to the other Big Five traits, however, the amount of initial level associations appeared somewhat smaller. Because this study assessed personality traits at a broad level of analysis, it is not clear which aspects or facets of openness to experience are most relevant in the context of social supportive relationships and interactions. This is particularly important, as facets of personality tend to change differentially across the lifespan (Jackson et al., 2009). For example, Terracciano, McCrae, Brant, and Costa (2005) demonstrated differential development of openness facets across the lifespan. Whereas openness to aesthetics tended to be relatively stable in adulthood, openness to values showed the largest decline of the openness facets.

In general, it is worth noting that individual differences in personality traits and social support at baseline shared similarly high commonalities, as did individual differences in changes from T1 to T2. Indeed, our additional equality tests demonstrated that the level and change covariances were equal. In that sense, correlated changes between traits and social support may reflect a dynamic variant of the static interrelations at the initial level. These results clearly emphasize the dynamic nature of change in personality traits and perceived social support in middle adulthood.

Limitations and Future Directions

Our findings may reflect the shortcomings of the construct perceived (or anticipated) social support. It is unclear, whether participants actually needed social support or whether they actually have received support from others. Moreover, the actual composition of the individual's network and the type of the social network are unclear. However, research demonstrated the predictive validity of perceived social support for physical and psychological health (Holt-Lunstad et al., 2010; Taylor, 2011; Uchino, 2009). An important advance for future research would be to combine structural indicators of social support (e.g., type of the social network) with indicators of perceived and received support. Second, all

measures were self-reports and thus subject to bias. Future research should include other-reports and observer ratings from the social network members. Observer ratings would eliminate the shared variance from self-reports.

Third, like most longitudinal designs, the latent change models require attention to the timing of assessments. The time interval that is needed to accurately capture systematic change in the constructs of interest and to determine correlated change is an important developmental aspect. Time intervals that are too short or too long in relation to the nature of the phenomenon being studied can produce data that, in some cases, is overly sensitive to measurement errors and carry-over effects and, in other cases, are insensitive to variability and change (cf. Hertzog & Nesselroade, 2003). Moreover, the present study was restricted to two occasions of measurement. As such, they implicitly assume linear change between the two assessments, which may not be an apt description of change over long time intervals. An important advance for future research would be to have a longitudinal design with more than two assessments to better capture correlate change, and to have better estimates of correlations between level and change scores (cf. Raudenbush & Bryk, 2002).

Fourth, the latent change modeling approach has limitations. When interpreting correlated change models, it is important to consider the possibility that a third variable may have affected both personality traits and perceived social support at the same time. For example, difficult life experiences in middle adulthood may increase the need for social support and simultaneously affect personality trait development. In addition to meaningful causes such as life events, less meaningful sources of systematic transient error may inflate estimates of correlated change. Future research should identify potential third variables that affect correlated change. Finally, future research may use exploratory structural equation models (ESEM; see Marsh et al., 2013) as a viable alternative to parceling techniques.

Conclusions

The present study significantly extends prior research on the associations between the Big Five personality traits and perceived social support by examining these relations longitudinally over eight years using latent change models. The results indicate that the Big Five personality traits are related to different types of perceived social support. More important, the results show that changes in personality traits are also related to changes in the perception of the availability of social support, and thus support the notion of correlated change. In general, the results provide a better understanding of the long-term longitudinal associations between personality traits and perceived social support in middle adulthood.

References

Allemand, M. (in press). Development in middle adulthood. In J. Wright (Ed.), *International encyclopedia of social and behavioral sciences* (2nd edition), Amsterdam: Elsevier.

Allemand, M., Gomez, V., & Jackson, J. J. (2010). Personality trait development in midlife: Exploring the impact of psychological turning points. *European Journal of Ageing, 7,* 147-155.

Allemand, M., Zimprich, D., & Hertzog, C. (2007). Cross-sectional age differences and longitudinal age changes of personality in middle adulthood and old age. *Journal of Personality*, *75*, 323-358.

Allemand, M., Zimprich, & Martin, M. (2008). Long-term correlated change in personality traits in old age. *Psychology and Aging, 23*, 545-557.

Amirkhan, J., Risinger, R., & Swickert, R. (1995). Extraversion: A 'hidden' personality factor in coping? *Journal of Personality*, *63*, 189-212.

Antonucci, T. C., Akiyama, H., & Merline, A. (2001). Dynamics of social relationships in midlife. In M. E. Lachman (Ed.), *Handbook of midlife development* (pp. 571-598), Hoboken, NJ: Wiley.

Asendorpf, J. B., & Wilpers, S. (1998). Personality effects on social relationships. *Journal of Personality and Social Psychology*, *71*, 94-109.

Asendorpf, J. B., & van Aken, M. A. G. (2003). Personality-relationship transaction in adolescence: Core versus surface personality characteristics. *Journal of Personality*, *71*, 629-666.

Borkenau, P., & Ostendorf, F. (1993). *NEO-Fünf-Faktoren Inventar (NEO-FFI) nach Costa und McCrae* [NEO Five-Factor Inventory (NEO-FFI) according to Costa and McCrae]. Göttingen: Hogrefe.

Branje, S., van Lieshout, C., & van Aken, M. (2005). Relations between agreeableness and perceived support in family relationships: why nice people are not always supportive. *International Journal of Behavioural Development*, *29*, 120-128.

Browne, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. In K. A. Bollen & J. S. Long (Eds.), *Testing Structural Equation Models* (pp. 136-162). Beverly Hills, CA: Sage.

Cheung, G.W., & Rensvold, R. B. (1999). Testing factorial invariance across groups: A reconceptualization and proposed new method. *Journal of Management, 25*, 1-27.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.

Cohen, S., Underwood, L. G., & Gottlieb, B. H. (2000). *Social support measurement and intervention.* Oxford: University Press.

Dehle, C., & Landers, J. (2005). You can't always get what you want, but can you get what you need? Personality traits and social support in marriage. *Journal of Social and Clinical Psychology*, *24*, 1051-1076.

Derryberry, D., & Reed, M. A. (1994). Temperament and attention: Orienting toward and away from positive and negative signals. *Journal of Personality and Social Psychology, 66*, 1128-1139.

Donnellan, M. B., Larsen-Rife, D., & Conger, R. D. (2005). Personality, family history, and competence in early adult romantic relationships. *Journal of Personality and Social Psychology*, *88*, 562-576.

Eaton, L. G., & Funder, D. C. (2003). The creation and consequences of the social world: an interactional analysis of extraversion. *European Journal of Personality*, *17*, 375-395.

Fydrich, T., Geyer, M., Hessel, A., Sommer, G., & Brähler, E. (1999). Fragebogen zur Sozialen Unterstützung (F-SozU): Normierung an einer repräsentativen Stichprobe [Questionnaire for the assessment of social support (F-SozU): Norms from a representative sample]. *Diagnostica*, *45*, 212-216.

Fydrich, T., Sommer, G., & Bähler, E. (2007). *F-SozU: Fragebogen zur sozialen Unterstützung* [F-SozU: Questionnaire for the assessment of social support]. Göttingen: Hogrefe.

Harber, K., Schneider, J., Everard, K., & Fisher, E. (2005). Directive support, nondirective support, and morale. *Journal of Social and Clinical Psychology*, *24*, 691-722.

Helson, R., & Soto, C. J. (2005). Up and down in middle age: Monotonic and nonmonotonic changes in roles, status, and personality. *Journal of Personality and Social Psychology, 89*, 194-204.

Hertzog, C., & Nesselroade, J. R. (2003). Assessing psychological change in adulthood: An overview of methodological Issues. *Psychology and Aging*, *18*, 639-657.

Hill, P. L., Payne, B. R., Jackson, J. J., Stine-Morrow, E. A. L., & Roberts, B. W. (2013). Perceived social support predicts increased conscientiousness during older adulthood. *Journals of Gerontology, Series B: Psychological Sciences and Social Sciences.*

Hill, P. L., Turiano, N. A., Rand, M. D., Mroczek, D. K., & Roberts, B. W. (2011). Conscientiousness and longevity: An examination of possible mediators. *Health Psychology, 30*, 536-541.

Hittner, J., & Swickert, R. (2001). Modeling functional and structural social support via confirmatory factor analysis: evidence for a second-order global support construct. *Journal of Social Behaviour and Personality*, *16*, 69-80.

Holt-Lunstad, J., Smith, T. B., & Layton, J. B. (2010). Social relationships and mortality risk: A meta-analytic review. *PLOS Med 7*(7).

Hu, L., & Bentler, P. M. (1998). Fit indices in covariance structure modeling: sensitivity to underparameterized model misspecification. *Psychological Methods, 3*, 424-453.

Jackson, J. J., & Allemand, M. (2014). Moving personality development research forward: Applications using structural equation models. *European Journal of Personality, 28*, 300-310.

Jackson, J. J., Bogg, T., Walton, K. E., Wood, D., Harms, P. D., Lodi-Smith, J., Edmonds, G. W., & Roberts B. W. (2009). Not all conscientiousness scales change alike: A multimethod, multisample study of age differences in the facets of conscientiousness. *Journal of Personality and Social Psychology*, *96*, 446-459.

Jensen-Campbell, L., & Graziano, W. (2001). Agreeableness as a moderator of interpersonal conflict. *Journal of Personality*, *69*, 323-362.

John, O. P., & Srivastava, S. (1999). The Big Five trait taxonomy: History, measurement, and theoretical perspectives. In L. A. Pervin & O. P. John (Eds.), *Handbook of personality: Theory and research* (2nd ed., pp. 102-138), New York, NY: Guilford Press.

Lachman, M. E. (2001). *Handbook of midlife development.* New York: Wiley.

Lachman, M. E. (2004). Development in midlife. *Annual Review of Psychology*, *55*, 305-331.

Lee-Baggley, D., Preece, M., & DeLongis, A. (2005). Coping with interpersonal stress: role of Big Five traits. *Journal of Personality*, *73*, 1141-1180.

Little, T. D., Cunningham, W. A., Shahar, G., & Widaman, K. F. (2002). To parcel or not to parcel: Exploring the question, weighing the merits. *Structural Equation Modeling, 9*, 151-173.

Little, T. D., Rhemtulla, M., Gibson, K., & Schoemann, A. M. (2013). Why the items versus parcels controversy needn't be one. *Psychological Methods, 18*, 285-300.

Lodi-Smith, J., & Roberts, B. W. (2007). Social investment and personality: A meta-analysis of the relationship of personality traits to investment in work, family, religion, and volunteerism. *Personality and Social Psychology Review*, *11*, 1-19.

Lucas, R. E. & Donnellan, M. B. (2011). Personality development across the life span: Longitudinal analyses with a national sample from Germany. *Journal of Personality and Social Psychology, 101*, 847-861.

Marsh, H. W., & Hau, K.-T. (1996). Assessing goodness of fit: Is parsimony always desirable? *Journal of Experimental Education, 64*, 364-390.

Marsh, H. W., Lüdtke, O., Nagengast, B., Morin, A. J. S., & Von Davier, M. (2013). Why item parcels are (almost) never appropriate: Two wrongs do not make a right – Camouflaging misspecification with item parcels in CFA models. *Psychological Methods, 18*, 257-284.

McArdle, J. J. (2009). Latent variable modeling of differences and changes with longitudinal data. *Annual Review of Psychology, 60*, 577-605.

McArdle, J. J., & Hamagami, F. (2001). Linear dynamic analyses of incomplete longitudinal data. In L. Collins, & A. Sayer (Eds.), *Methods for the analysis of change* (pp. 139–175). Washington, DC: American Psychological Association.

McArdle, J. J., & Nesselroade, J. R. (1994). Using multivariate data to structure developmental change. In S. H. Cohen, & H. W. Reese (Eds.), *Lifespan developmental psychology: Methodological contributions* (pp. 223-267). Hillsdale, NJ: Lawrence Erlbaum.

McArdle, J. J., & Nesselroade, J. R. (2014). *Longitudinal data analysis using structural equation models*. Washington, DC: American Psychological Association.

Meredith, W., & Horn, J. L. (2001). The role of factorial invariance in modeling growth and change. In L. M. Collins & A. G. Sayer (Eds.), *New methods for the analysis of change* (pp. 203-240). Washington, DC: American Psychological Association.

Mroczek, D. K., Almeida, D. M., Spiro, A., & Pafford, C. (2006). Intraindividual change in personality. In D. K. Mroczek & T. D. Little (Eds.), *Handbook of personality development* (pp. 163-180). Mahwah, NJ: Erlbaum.

Muthén, L. K., & Muthén, B. O. (1998-2012). *Mplus user's guide*. Los Angeles, CA: Muthén & Muthén.

Neyer, F. J., & Asendorpf, J. B. (2001). Personality-relationship transaction in young adulthood. *Journal of Personality and Social Psychology*, *81*, 1190-1204.

Ozer, D. J., & Benet-Martinez, V. (2006). Personality and the prediction of consequential outcomes. *Annual Review of Psychology*, *57*, 401-421.

Pierce, G. R., Lakey, B., Sarason, I. G., Sarason, B., & Joseph, H. J. (1997). Personality and social support processes: A conceptual overview. In G. R. Pierce, B. Lakey, I. G. Sarason & B. Sarason (Eds.), *Sourcebook of social support and personality* (pp. 3-18). New York: Plenum Press.

Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear models: Applications and data analysis methods.* Thousand Oaks, CA: Sage.

Roberts, B. W., & DelVecchio, W. F. (2000). The rank-order consistency of personality traits from childhood to old age: A quantitative review of longitudinal studies. *Psychological Bulletin, 126*, 3-25.

Roberts, B. W., Kuncel, N. R., Shiner, R., Caspi, A., & Goldberg L. R. (2007). The power of personality: The comparative validity of personality traits, socioeconomic status, and cognitive ability for predicting important life outcomes. *Perspectives on Psychological Science*, *2*, 313-345.

Roberts, B. W., & Mroczek, D. K. (2008). Personality trait stability and change. *Current Directions in Psychological Science, 17*, 31-35.

Roberts, B. W., Walton, K. E., & Bogg, T. (2005). Conscientiousness and health across the life course. *Review of General Psychology*, *9*, 156-168.

Roberts, B. W., Walton, K. E. & Viechtbauer, W. (2006). Patterns of mean-level change in personality traits across the life course: A meta-analysis of longitudinal studies. *Psychological Bulletin, 132*, 1-25.

Russel, D., Booth, B., Reed, D., & Laughlin, P. (1997). Personality, social networks, and perceived social support among alcoholics: A structural equation analysis. *Journal of Personality*, *65*, 649-692.

Steiner, M., Allemand, M., & McCullough, M. E. (2011). Age differences in forgivingness: The role of transgression frequency and intensity. *Journal of Research in Personality, 45*, 670-678.

Steiner, M., Allemand, M., & McCullough, M. E. (2012). Do agreeableness and neuroticism explain age differences in the tendency to forgive others? *Personality and Social Psychology Bulletin, 38*, 441-453.

Swickert, R. (2009). Personality and social support. In P. Corr & G. Matthews (Eds.), *Cambridge handbook of personality* (pp. 524-540). Cambridge: Cambridge University Press.

Swickert, R. J., Hittner, J. B., & Foster, A. (2010). Big Five traits interact to predict perceived social support. *Personality and Individual Differences*, *48*, 736-741.

Swickert, R., Rosentreter, C., Hittner, J., & Mushrush, J. (2002). Extraversion, social support processes, and stress. *Personality and Individual Differences*, *32*, 877-891.

Taylor, S. E. (2011). Social support: A review. In M. S. Friedman (Ed.), *Handbook of health psychology* (pp. 189-214). New York, NJ: Oxford University Press.

Terracciano, A., McCrae, R. R., Brant, L. J., & Costa, P. T., Jr. (2005). Hierarchical linear modeling analyses of the NEO-PI-R scales in the Baltimore Longitudinal Study of Aging. *Psychology and Aging, 20*, 493-506.

Uchino, B. N. (2009). Understanding the links between social support and physical health: A lifespan perspective with emphasis on the separability of perceived and received support. *Perspectives on Psychological Science, 4*, 236-255.

Von Dras, D., & Siegler, I. (1997). Stability in extraversion and aspects of social support at midlife. *Journal of Personality and Social Psychology*, *72*, 233-241.

Widaman, K. F., Ferrer, E., & Conger, R. D. (2010). Factorial invariance within longitudinal structural equation models: Measuring the same construct across time. *Child Developmental Perspectives, 4*, 10-18.

Willis, S. L., & Martin, M. (2005). *Middle adulthood: A lifespan perspective.* Thousand Oaks, CA: Sage.

Wilt, J., & Revelle, W. (2009). Extraversion. In M. R. Leary & R. H. Hoyle (Eds), *Handbook of individual differences in social behavior* (pp. 27-45). New York, NY: Guilford Press.

Footnotes

1. Although the perceived social support scales were developed with the goal to measure different aspects of anticipated support, we found relatively strong intercorrelations between the social support scales (see Table 1). We, thus, estimated an unconstrained longitudinal model with two latent factors per measurement occasion in which the emotional support, practical support and social integration parcels were specified to load on one "positive" factor, and the social strain parcels were specified to load on the "negative" factor, resulting in χ^2 (234) = 831.64, CFI = .902, RMSEA = .086, 90% CI = .080; .092. In comparison to the unconstrained model with four latent factors (M1, Table 2), the two-factor model resulted in a significant loss in fit, $\Delta\chi^2$ (22) = 391.81.34, $p < .01$. Therefore, we decided to use the four-factor model of perceived social support in our analyses.

2. A more elegant analytic approach would be to simultaneously include all personality traits and social support constructs in one single latent change model. Because of convergence and estimation issues, we decided to test five separate models that included one trait and four social support constructs at a time in the same latent change model.

Table 1

Descriptive Statistics and Correlations of the Study Variables

	1	2	3	4	5	6	7	8	9
1. Neuroticism	—	-.41	-.15	-.22	-.31	-.37	-.27	-.52	.51
2. Extraversion	-.38	—	.19	.17	.32	.37	.35	.41	-.22
3. Openness	-.14	.21	—	*.09*	*-.03*	.15	*.04*	.11	*-.08*
4. Agreeableness	-.28	.11	*.07*	—	.25	.30	.31	.36	-.39
5. Conscientiousness	-.39	.28	*-.09*	.26	—	.34	.34	.34	-.31
6. Emotional support	-.35	.34	.15	.23	.27	—	.71	.72	-.55
7. Practical support	-.26	.29	*.09*	.26	.21	.69	—	.71	-.51
8. Social integration	-.46	.39	*.09*	.36	.30	.67	.62	—	-.71
9. Social strain	.48	-.19	*-.01*	-.37	-.27	-.48	-.43	-.68	—
M (T1)	1.30	2.38	2.28	2.67	2.91	4.15	3.98	3.93	1.89
SD (T1)	0.58	0.46	0.46	0.42	0.43	0.49	0.51	0.48	0.59
M (T2)	1.42	2.30	2.30	2.68	2.91	4.16	4.00	3.91	1.91
SD (T2)	0.62	0.49	0.48	0.40	0.46	0.53	0.53	0.57	0.65

Note. $N = 346$; correlations at T1 are reported below the diagonal; correlations at T2 are reported above the diagonal; correlations are statistically significant at $p < .05$; correlations in italics are non-significant.

Table 2

Longitudinal Measurement Invariance

Model	χ^2 (*df*)	CFI	RMSEA (90% CI)	$\Delta\chi^2$ (Δdf)	ΔModels
Personality traits					
M1: Configural invariance	601.39** (345)	.949	.046 (.040; .052)		
M2: Weak invariance	616.19** (355)	.948	.046 (.040; .052)	14.80 (10)	2-1
M3: Strong invariance	636.49** (365)	.946	.046 (.040; .052)	20.30* (10)	3-2
M4: Strict invariance	658.97** (380)	.945	.046 (.040; .052)	22.48 (15)	4-3
Perceived social support					
M1: Configural invariance	439.83** (212)	.963	.056 (.048; .063)		
M2: Weak invariance	445.42** (220)	.963	.054 (.047; .062)	5.59 (8)	2-1
M3: Strong invariance	457.99** (228)	.962	.054 (.047; .061)	12.57 (8)	3-2
M4: Strict invariance	474.94** (240)	.961	.053 (.046; .060)	16.95 (8)	4-3

Note. $N = 346$; we used an alternative parameterization to identification and scale setting (see Allemand et al., 2007, p. 332): We scaled common factors by fixing their variances to unity and freely estimated all loadings. Furthermore, we set the factor means to zero and estimated intercepts of all manifest indicators instead. These identification constraints were relaxed in conjunction with more restrictive models of measurement invariance. M1: Equal/unconstrained form (factor variances were fixed to unity at T1 and T2; factor means were fixed to zero at T1 and T2); M2: M1 plus equal factor loadings (factor variances were fixed to unity at T1 and freely estimated at T2; factor means were fixed to zero at T1 and T2); M3: M2 plus equal indicator intercepts (factor variances were fixed to unity at T1 and freely estimated at T2; factor means were fixed to zero at T1 and freely estimated at T2); M4: M3 plus equal indicator residual variances (factor variances were fixed to unity at T1 and freely estimated at T2; factor means were fixed to zero at T1 and freely estimated at T2); M5: M4 plus equal latent means; CFI: comparative fit index; RMSEA: root mean

squared of approximation; 90% CI: 90% confidence interval for RMSEA; $\Delta\chi^2$: nested chi-square difference; Δdf: difference in degrees of freedom; ΔModels: comparison of models.

*$p < .05$, **$p < .01$.

Table 3

Longitudinal Change and Individual Differences in Change

Model	Rank-order stability (*r*)	Mean-level change (Δ*M*)	Level-change correlation (*r*)	Change variance (Δ*Var*)	*SE*
Personality traits					
Neuroticism	.69*	.20*	-.31*	0.68*	.09
Extraversion	.75*	-.17*	-.29*	0.53*	.08
Openness	.88*	.04	-.23*	0.24*	.06
Agreeableness	.79*	.04	-.38*	0.40*	.08
Conscientiousness	.81*	-.01	-.28*	0.38*	.08
Perceived social support					
Emotional support	.56*	-.02	-.37*	1.01*	.12
Practical support	.68*	.02	-.30*	0.71*	.10
Social integration	.62*	-.06	-.24*	1.00*	.14
Social strain	.62*	.02	-.33*	0.86*	.11

Note. $N = 346$; estimates of rank-order stability (*r*) and mean-level change (Δ*M*: scaled as mean difference from T1 as reference) are based on Model 4 (Table 2); estimates of within-domain level-change correlation (*r*), change variance (Δ*Var*) and standard error (SE) are based on latent change models. The overall fit of these models exactly mirror the fit of Model 4 (Table 2).

*$p < .01$.

Table 4

Correlations Between Personality Traits and Perceived Social Support

Model	Latent correlations *r*				Model fits		
	Level	Change	$Level_P$-$change_S$	$Level_S$-$change_P$	χ^2 (*df*)	CFI	RMSEA (90% CI)
M5: *Neuroticism*					681.23** (380)	.959	.048 (.042; .054)
Emotional support	-.41**	-.40**	.06	.20**			
Practical support	-.31**	-.21**	.01	.03			
Social integration	-.57**	-.56**	.06	.18*			
Social strain	.59**	.51**	-.11	-.22**			
M6: *Extraversion*					673.15** (380)	.960	.047 (.041; .053)
Emotional support	.41**	.42**	-.04	-.21**			
Practical support	.39**	.42**	-.01	-.12			
Social integration	.49**	.54**	-.10	-.15*			
Social strain	-.21**	-.32**	.04	.14			
M7: *Openness*					653.54** (380)	.961	.046 (.040; .051)
Emotional support	.29**	.44**	-.07	-.24**			
Practical support	.18**	.36**	-.09	-.11			
Social integration	.22**	.43**	-.01	-.20*			
Social strain	-.05	-.31**	-.21*	.10			
M8: *Agreeableness*					630.36** (380)	.964	.044 (.038; .050)

Emotional support	.27**	.16#	-.02	.01			
Practical support	.35**	.24*	-.02	-.05			
Social integration	.47**	.39**	-.05	-.18*			
Social strain	-.47**	-.44**	.05	.19*			
M9: *Conscientiousness*					741.76** (380)	.948	.052 (.047; .058)
Emotional support	.34**	.36**	-.06	-.05			
Practical support	.28**	.24**	.07	.04			
Social integration	.40**	.42**	-.05	-.05			
Social strain	-.40**	-.46**	.05	.15			

Note. $N = 346$; $level_P$-$change_S$: correlation between level personality trait scale and change social support scale; $level_S$-$change_P$: correlation between level social support scale and change personality trait scale; CFI: comparative fit index; RMSEA: root mean squared of approximation; 90% CI: 90% confidence interval for RMSEA.

#$p < .07$, *$p < .05$, **$p < .01$.